

REMARKS

In the outstanding Office Action, the Examiner rejected claims 14-17 and 24-27 under 35 U.S.C. § 112, first and second paragraphs; rejected claim 14 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,619,680 to Nourshargh et al. ("Nourshargh"); rejected claims 15-17, 24-26 and 29 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,605,228 to Kawaguchi et al. ("Kawaguchi") in view of U.S. Patent No. 3,850,604 to Klein ("Klein") and Nourshargh; rejected claims 18-20 under 35 U.S.C. § 103(a) as being unpatentable over Kawaguchi in view of Klein and Nourshargh, and further in view of U.S. Patent No. 4,915,810 to Kestigian et al. ("Kestigian"); and rejected claim 27 under 35 U.S.C. § 103(a) as being unpatentable over Kawaguchi in view of Klein, Nourshargh and U.S. Patent No. 6,615,614 to Makikawa ("Makikawa").

By this amendment, Applicants have amended claim 14. Claims 14-29 remain pending, with claims 14-20, 24-27 and 29 presented for examination.

I. Rejection under 35 U.S.C. § 112, first paragraph

Regarding the rejection of claims 14-17 and 24-27 under 35 U.S.C. § 112, first paragraph, the Examiner states: "there is no support for the new limitation that the core layer deposit remains on a sidewall portion of the ridge structure." Office Action, page 2. Applicants respectfully disagree with the Examiner's assertion¹, and submit that the specification and drawings provide adequate support for the element "a core layer deposit remaining on the ridge and sidewall portions such that the remaining core layer deposit covers the ridge and sidewall portions of the ridge structure," as recited in amended claim 14. For example, FIG. 1B shows

¹ The Office Action contains a number of statements reflecting characterizations of the related art and the claims. Regardless of whether any such statement is identified herein, Applicants decline to automatically subscribe to any statement of characterization in the Office Action.

ridge structure 11 with sidewall 12, wherein core material 20 remains and covers ridge portion 16 and sidewall 12. This is further described in the specification at, for example, paragraph [0023]. Applicants respectfully submit that as described herein, the specification contains adequate support for the element “a core layer deposit remaining on the ridge and sidewall portions such that the remaining core layer deposit covers the ridge and sidewall portions of the ridge structure,” as recited in amended claim 14, and is thus in compliance with the first paragraph of 35 U.S.C. § 112. Accordingly, Applicants respectfully request that the rejection of claims 14-17 and 24-27 under 35 U.S.C. § 112, first paragraph, be withdrawn.

II. Rejection under 35 U.S.C. § 112, second paragraph

Regarding the rejection of claims 14-17 and 24-27 under 35 U.S.C. § 112, second paragraph, the Examiner states: “[t]he claims are indefinite due to the new limitation of claim 14 that the core layer deposit remains on a sidewall portion of the ridge structure ... there is no description in the specification or in the arguments as to what such does or does not cover.” Office Action, page 3. Applicants have amended claim 14, which now recites a combination including “a core layer deposit remaining on the ridge and sidewall portions such that the remaining core layer deposit covers the ridge and sidewall portions of the ridge structure.” As discussed above, this is adequately defined in the drawings and specification at, for example, FIGS. 1A-2, and paragraph [0023]. As can be readily seen from at least FIGS. 1B and 1C, even after the deposit of upper cladding layer 30, core deposit 20 remains on, and covers, ridge portion 16 and sidewall portion 12 of the ridge structure 11. Accordingly, Applicants respectfully submit that claim 14 is in compliance with the second paragraph of 35 U.S.C. § 112, and respectfully request that the rejection of claims 14-17 and 24-27 under this section be withdrawn.

III. Rejection under 35 U.S.C. § 102(b)

Regarding the rejection of claim 14 under 35 U.S.C. § 102(b), Applicants respectfully disagree with the Examiner's arguments and conclusions as set forth in the outstanding Office Action. Accordingly, Applicants respectfully traverse this rejection.

In order to properly anticipate Applicants' claimed invention under 35 U.S.C. § 102, each and every element of the claim in issue must be found, "either expressly or inherently described, in a single prior art reference." "The identical invention must be shown in as complete detail as is contained in the . . . claim. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)." *See* M.P.E.P. § 2131, 8th Ed. (Rev. 2), May, 2004.

Applicants respectfully submit that Nourshargh cannot anticipate claim 14, because that reference fails to teach the claimed combination including at least "a core layer deposit remaining on the ridge and sidewall portions such that the remaining core layer deposit covers the ridge and sidewall portions of the ridge structure," as recited in amended claim 14.

Nourshargh teaches:

the desired waveguide pattern is first written on a substrate 11 using photolithography ... core glass 14 is deposited on the substrate ... and by suitably controlling the amount of dopant in the core glass as the dopant in the core glass as the deposition process is carried out, it may have any desired refractive-index profile across its thickness *which is less than the depth of the grooves 13* so that the waveguide is fully embedded within the grooves 13. Nourshargh, col. 2, lines 7-28 (emphasis added).

As further shown in Fig. 2(c), since the thickness of the core glass 14 is less than the depth of the grooves 13, core glass 14 is not "remaining on the ridge and sidewall portions such that the remaining core layer deposit covers the ridge *and* sidewall portions of the ridge structure," as recited in claim 14 (emphasis added).

Moreover, the Examiner at page 4 of the Office Action, states that Nourshargh “shows that layer 14 is over halfway up the sidewall.” Assuming the Examiner’s characterization to be accurate, the layer is only halfway up the sidewall, and thus would not cover the sidewall. Therefore, by the Examiner’s own admission, Nourshargh fails to teach a combination including “the remaining core layer deposit covers the ridge and sidewall portion,” as recited in claim 14. Since Nourshargh fails to teach each and every element of claim 14, that reference cannot anticipate the claim. Accordingly, Applicants respectfully request that the rejection of claim 14 under 35 U.S.C. § 102(b) be withdrawn.

IV. Rejections under 35 U.S.C. § 103(a)

Regarding the rejection of claims 15-20, 24-26 and 29 under 35 U.S.C. § 103(a), Applicants respectfully disagree with the Examiner’s arguments and conclusions as set forth in the outstanding Office Action. Accordingly, Applicants respectfully traverse this rejection.

To establish a *prima facie* case of obviousness under 35 U.S.C. §103(a), each of three requirements must be met. First, the reference or references, taken alone or combined, must teach or suggest each and every element recited in the claims. *See* M.P.E.P. §2143.03 8th Ed. (Rev. 2), May, 2004. Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the references in a manner resulting in the claimed invention. Third, a reasonable expectation of success must exist. Moreover, each of the three requirements must “be found in the prior art, and not be based on applicant’s disclosure.” *See* M.P.E.P. § 2143 8th Ed. (Rev. 2), May, 2004.

A. Kawaguchi in view of Klein and Nourshargh

Claims 15-17 and 24-26 depend from claim 14, and thus require all of the elements of claim 14. The combination of Kawaguchi, Klein, and Nourshargh fails to teach or suggest every element of claim 14, and therefore fails to teach every element required by dependent claims 15-17 and 24-26. Claim 14 recites a combination including “wherein the process excludes a separate step of patterning the core layer, and wherein the planar optical device is formed with a core layer deposit remaining on the ridge and sidewall portions such that the remaining core layer deposit covers the ridge and sidewall portions of the ridge structure,” As discussed above, Nourshargh fails to teach this element. Kawaguchi also fails to teach at least this element.

Kawaguchi teaches a process for fabricating planar optical waveguide devices. Kawaguchi, col. 1, lines 38-45. The process requires placing a photoresist in a prescribed waveguide pattern over a surface of a substrate. *Id.* at col. 5, lines 64-66. Recesses 12a (Figures 7a-7e) are formed in the substrate using an etching process. *Id.* at col. 5, line 66- col. 6, line 2. A core layer 14’ is subsequently formed on the substrate and in the recesses. *Id.* at col. 6, lines 3-10. The core layer is then *patterned*, using either polishing or etching, such that the core layer 14’ *remains only in the recess* 12a, “and the core 14 and the substrate 12 jointly define a planar surface.” *Id.* at col. 6, lines 16-20. The process described in Kawaguchi involves a plurality of separate steps, including forming the core layer, doping the core layer, HIPping the assembly, and then patterning the core layer. *Id.* at col. 6, lines 6-20.

Accordingly, Kawaguchi fails to teach at least the element, “wherein the process excludes a separate step of patterning the core layer, and wherein the planar optical device is formed with a core layer deposit remaining on the ridge and sidewall portions such that the remaining core

layer deposit covers the ridge and sidewall portions of the ridge structure,” as recited in amended claim 14, and required by dependent claims 15-17 and 24-26.

Klein, cited for teaching “what one of ordinary skill in the art thinks of when one is to sputter glass,” fails to cure the deficiencies of Kawaguchi. Klein teaches a general method for sputtering a target using, for example, an RF discharge. Klein, col. 4, lines 3-15. Klein, however, fails to teach or suggest at least the element, “wherein the process excludes a separate step of patterning the core layer, and wherein the planar optical device is formed with a core layer deposit remaining on the ridge and sidewall portions such that the remaining core layer deposit covers the ridge and sidewall portions of the ridge structure,” as recited in amended claim 14, and required by claims 15-17 and 24-26.

Nourshargh is apparently cited by the Examiner for teaching:

“removal of the rest of the first layer is not required”, and that “the second layer of glass can be immediately deposited”. Office Action, page 6.

Nourshargh, however, fails to cure the above-noted deficiencies of Kawaguchi and Klein

Furthermore, there is no motivation for combining the references in the manner that the Examiner is suggesting. The Examiner states as an alleged motivation for combining the references:

[i]t would have been obvious to form the Kawaguchi waveguide by using the Nourshargh mode of figure 2, so that one can immediately form the second layer over the first layer. Office Action, page 6.

Kawaguchi, however, specifically teaches:

a photoresist layer in a prescribed waveguide pattern is placed on a the surface of a substrate ... [a] core layer 14' is formed on the surface of the substrate ... [t]hen the surface of the assembly is removed until the surface of the substrate 12 is exposed either by physical polishing or chemical etching (Fig. 7d). This results in a

core 14 formed in the recess 12a of the substrate 12, and the core 14 and the substrate jointly define a planar surface. Kawaguchi, col. 5, line 64 - col. 6, line 20.

Accordingly, the method of Kawaguchi specifically teaches a process *including* a separate step of patterning the core layer. Moreover, as further taught by Kawaguchi, this separate step of patterning the core layer is to define a planar surface on which to deposit the upper clad layer to “reduce or eliminate the voids 18” in the upper cladding layer: *Id.*, at col. 6, lines 13-14.

[w]hen a recess is formed in the lower clad layer to form the core in the recess, the upper clad layer may be placed on a planar surface, and creation of voids in the upper cladding layer can be avoided. *Id.*, at col. 1, lines 59-62.

Therefore, since Kawaguchi specifically utilizes a separate step of patterning the core layer to eliminate or reduce voids, one of ordinary skill in the art, when looking to modify Kawaguchi, would not have been motivated to “form the Kawaguchi waveguide by using the Nourshargh mode of figure 2,” as the Examiner is suggesting. It is thus apparent that the Examiner’s approach to the ultimate legal conclusion of obviousness amounts to a retrospective assessment as to how the claimed invention works and then combining references with divergent teachings to arrive at the claimed invention, a reverse engineering approach that has been repeatedly judicially condemned. *See Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 USPQ2d 1434 (Fed. Cir. 1988). Absent such hindsight reasoning, one of ordinary skill in the art would not have been motivated to combine the references in the manner suggested by the Examiner.

For at least the above reasons, Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness. Accordingly, Applicants respectfully request that the rejection of claims 15-17 and 24-26 under 35 U.S.C. § 103(a) be withdrawn.

Independent claim 29 recites a combination including, “a second radio frequency power is applied to the ridge structure” and “wherein the process excludes a separate step of patterning the core layer.” Kawaguchi, whether taken alone or in combination, fails to teach at least these elements.

As discussed above, Kawaguchi teaches a process for fabricating planar optical waveguide devices wherein a core layer is deposited and then patterned using either etching or polishing (i.e., a separate step of patterning) to reduce or eliminate voids. Kawaguchi, col. 6, lines 16-20. Kawaguchi further uses a standard CVD procedure in the fabrication of the planar optical waveguide device, but does not teach or suggest the use of a first or second radio frequency power in the fabrication process. *Id.* at col. 5, lines 50-54. Thus, Kawaguchi fails to teach at least the elements, “a second radio frequency power is applied to the ridge structure” and “wherein the process excludes a separate step of patterning the core layer,” as recited in claim 29.

Klein fails to cure the deficiencies of Kawaguchi. As discussed above, Klein fails to teach or suggest at least the element, “wherein the process excludes a separate step of patterning the core layer.” Moreover, Klein teaches the use of an RF discharge in a typical glass sputtering process. Klein, col. 4, lines 3-15. Klein, however, fails to teach or suggest at least the use of a *second* radio frequency power in the glass sputtering process. Thus, Klein fails to teach or suggest at least the elements, “a second radio frequency power is applied to the ridge structure” and “wherein the process excludes a separate step of patterning the core layer,” as recited by claim 29.

Nourshargh fails to cure the above-noted deficiencies of Kawaguchi, and Klein. As discussed above, there is no motivation for combining Nourshargh with Kawaguchi to “form the

Kawaguchi waveguide by using the Nourshargh mode of figure 2,” as the Examiner suggested.

Moreover, Nourshargh teaches using chemical vapor deposition, but is silent as to the use of physical vapor deposition, or of a first or second radio frequency. Nourshargh, col. 2, lines 18-20.

In the Office Action, at page 8, the Examiner first states that “that such is inherently met.” Applicants remind the Examiner that: “[i]n relying upon the theory of inherency, *the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art.*” M.P.E.P. § 2112 (internal citations omitted, emphasis added).

Furthermore,

[t]he fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic...*“To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.” Id.* (internal citations omitted, emphasis added).

The Examiner fails to provide sufficient evidence from Kawaguchi, Klein or Nourshargh, or any recourse to extrinsic evidence, that makes clear that the element, “a second radio frequency power is applied to the ridge structure,” as recited in claim 29, is necessarily present in these references. Further, the Examiner fails to present sufficient factual basis and technical reasoning to demonstrate inherency. The Examiner states that “the power applied to one would not be applied to the other- they would have to be different,” without adequately quantifying this statement. Office Action, page 9. The Examiner merely adds that “[a]s a hypothetical example: [a] power of 500 watts is applied across the chamber ... the ridge structures would have 200

watts and the planar portion the rest, i.e. 300 watts.” *Id.* Despite the Examiner’s technical inaccuracies and mischaracterization of Applicants’ invention, the Examiner fails to provide a reason why the two portions could not have 250 watts or 500 watts, applied to the ridge structures, and 250 watts, or 0 watts, applied to the planar portion, and thus not a first and second power.

Rather than correctly demonstrate inherency as set forth in the M.P.E.P., the Examiner appears to have chosen a scenario in which hypothetically, the teachings of the references could be molded to meet the elements of the claim. In setting forth this impermissible hindsight reconstruction, the Examiner has merely provided conclusory statements about the references while failing to provide evidentiary support that the allegedly inherent characteristic *necessarily* flows from the teachings of the applied prior art. Consequently, the Examiner cannot properly infer that the element “a second radio frequency power is applied to the ridge structure,” as recited in claim 29, is inherently disclosed by Kawaguchi in view of Klein and Nourshargh.

Since the references fail to teach or suggest each and every element of claim 29, a *prima facie* case of obviousness has not been established. Accordingly, Applicants respectfully request the rejection of claim 29 under 35 U.S.C. § 103(a) be withdrawn.

B. Kawaguchi in view of Klein, Nourshargh, and Kestigian

Claim 18 recites a combination including at least the element, “wherein the process excludes a separate step of patterning the core layer.” Kawaguchi, whether taken alone, or in combination, fails to teach at least this element.

As discussed above, Kawaguchi utilizes a separate patterning step to form an integral planar surface between the core layer and the recesses to prevent voids from forming upon deposition of the upper cladding layer. Kawaguchi, e.g., col. 6, lines 16-20. Klein merely

teaches a typical glass sputtering method, as discussed above, and fails to cure the deficiencies of Kawaguchi. Nourshargh, as discussed in detail above, cannot be combined in the manner that the Examiner is suggesting, and accordingly cannot be relied upon by the Examiner to cure the deficiencies of Kawaguchi.

Kestigian further fails to cure the deficiencies of Kawaguchi. Kestigian teaches a method for forming targets for use in ion beam sputtering. Kestigian, abstract. Kestigian's method involves the formation of targets wherein plugs with different compositions can be inserted into a plurality of holes formed in the target. *Id.* at col. 3, lines 12-25. Kestigian, however, does not teach or suggest the formation of waveguides or core layers. Thus, Kestigian fails to teach or suggest at least the element, "wherein the process excludes a separate step of patterning the core layer," as recited in claim 18.

Since the references fail to teach or suggest each and every element of claim 18, a *prima facie* case of obviousness has not been established. Accordingly, Applicants respectfully request the rejection of claim 18 under 35 U.S.C. § 103(a) be withdrawn.

Claims 19-20 depend from claim 18, and thus require all of the elements of claim 18. Since Kawaguchi, whether taken alone or in combination with Klein, Nourshargh, and Kestigian, fails to teach each and every element of claim 18, the references further fail to teach each and every element of the dependent claims. Thus, a *prima facie* case of obviousness has not been made. Accordingly, Applicants respectfully request that the rejection of claims 19-20 under 35 U.S.C. § 103(a) be withdrawn.

C. Kawaguchi in view of Klein, Nourshargh, and Makikawa

Claim 27 depends from claim 14, and thus requires all of the elements of claim 14. As discussed above, neither Kawaguchi, nor Klein, nor Nourshargh teach or suggest at least the

element “wherein the process excludes a separate step of patterning the core layer, and wherein the planar optical device is formed with a core layer deposit remaining on the ridge and sidewall portions such that the remaining core layer deposit covers the ridge and sidewall portions of the ridge structure,” as recited in claim 14 and required by claim 27. Makikawa fails to cure the above-noted deficiencies of these references.

Makikawa, apparently cited by the Examiner at page 7 of the Office Action for teaching “etch[ing] silicon and then thermally oxidize the silicon and this results in non-deformed substrate,” discloses a method for preparing an optical waveguide substrate. As shown in FIG 1 (c)-(d), Makikawa teaches depositing a core layer 14 in grooves 12, and over oxidized substrate 13. Makikawa further teaches, however, that:

the surface of the resulting structure is abraded off until the substrate is exposed and a flat surface is defined ... [a]brasion is preferably continued until the buried portions of the core film are abrade several microns. This results in the substrate in which the core film segments 14 and the under clad film 13 are present on the same substrate surface. Makikawa, col. 3, lines 34-46.

Accordingly, this cannot constitute a teaching of “wherein the process excludes a separate step of patterning the core layer, and wherein the planar optical device is formed with a core layer deposit remaining on the ridge and sidewall portions such that the remaining core layer deposit covers the ridge and sidewall portions of the ridge structure,” as recited in claim 14 and required by claim 27. Since the references, whether taken alone or in combination, fail to teach or suggest each and every element required by claim 27, the Examiner has failed to establish a *prima facie* case of obviousness. Accordingly, Applicants respectfully request that the rejection of claim 27 under 35 U.S.C. § 103(a) be withdrawn.

In view of the foregoing amendments and remarks, Applicant respectfully requests reconsideration and reexamination of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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